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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

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LORD LINDSAY, Vice-President, in the Chair.

Capt. Charles Orde Brown, late Royal Artillery, Plumstead House, Plumstead;
Percy Lyall Hooker Davis, Esq., Computer in the *Nautical Almanac* Office;
Henry Martyn Taylor, Esq., M.A., Fellow and Tutor of Trinity College, Cambridge, and
Sylvanus Phillips Thompson, B.A. (Lond.), St. Mary's, York,

were balloted for and duly elected Fellows of the Society.

Jabez Moden, Esq.. W. J. H. Beechey, Esq., and W. Hislop, Esq., were expelled from the Society for non-payment of arrears of subscriptions.

On the Dimensions of Venus as determined during the recent Transit.

By Lieut.-Col. J. F. Tennant, R.E., F.R.S.

It is so very rarely that there is any possibility of the dimensions of *Venus* being satisfactorily measured, that I trust a determination, though in some respects imperfect, will be acceptable to astronomers.

The instrument used was a 6-inch telescope by Messrs. Cooke and Sons, equatoreally mounted, and supplied with a double-image micrometer, of Sir G. B. Airy's pattern, made by Messrs. Troughton and Simms. The micrometer was used during the Transit with the first lens, No. 3, and with this the magnifying power was about 128, and the value of one revolution of the screw was determined by a large number of transits of stars not far from the Pole to be $16''\cdot0625 \pm 0''\cdot0132$.

After the nearest limbs of *Venus* and the Sun had separated by four revolutions of the micrometer-head, I began to measure

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diameters of the planet. At first I endeavoured to measure horizontal diameters, but I soon found these inconvenient, and I proceeded to measure diameters in Declination, and afterwards in Right Ascension. I had no suspicion that any ascertainable compression would be found, and consequently was not prepared to use exact position-angles; and, indeed, using the micrometer with the solar reflector interposed between it and the object, I could not have determined these without a great deal of time being spent on them. I believe the positions are, however, within two or three degrees of the truth, having placed the line of separation of the images so that one image followed the other when the appropriate slow motion was used.

This micrometer seems to me singularly convenient for such a purpose as measuring a distance, if greater accuracy could be got in determining the scale; and when it is used, as I have used it, with an instrument having convenient illumination and equatoreal motion, I believe this is attainable. In the first place, the thick wire used for taking the transits should be replaced by a fine one (silk fibre), and then this must admit of being moved in the eye-tube so that it may occupy the same position as the real image in the eye-tube. I have found the parallax most annoying even after I had endeavoured to correct it, and am quite confident that these improvements would be attended with great advantage.

At $14^h\ 05^m$ S.T. I began to observe the diameters of *Venus* in Declination. From a mean of 28 of these I obtained a double diameter $= 7^r.9339 \pm 0^r.007371$, the observations ending at $14^h\ 45^m$ S.T. The resulting diameter, in which is included a correction of $+ 0''\cdot070$ for refraction, is

Diameter of *Venus* in Declination $= 63''\cdot789 \pm 0''\cdot0790$.

Again at $15^h\ 10^m$ I began to observe diameters in Right Ascension, and 20 such observations were made up to $15^h\ 35^m$ of Sid. Time. From these I deduce the value of a double diameter in R.A. to be $7^r.9822 \pm 0^r.013496$, and the

Diameter in R.A. $= 64''\cdot132 + 0''\cdot1205$,

in which is included $0''.025$ for the effect of refraction.

At $15^h\ 36^m$ S.T. I again began a new set of observations in R.A., and completed 20 measures about $15^h\ 52^m$ S.T. The resulting double diameter was $7^r.9680 \pm 0^r.005963$, whence

Diameter in R.A. $= 64''\cdot015 \pm 0''\cdot0711$.

The mean of these two last is $64''.035 + 0''.0684$, which differs so considerably from the diameter in Declination as to give a decided indication of elliptic form. The value deduced for the compression is

$$c = \frac{1}{259\cdot3 \pm 77\cdot6}.$$

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But it must be remembered that this result is an inferior limit to the value, as it is improbable that either the polar or equatoreal measures were taken. I do not know of any attempt to determine the inclination and node of the equator of *Venus*.

If we neglect the compression and combine the three results of diameter, we shall have

Mean Diameter of *Venus* as a sphere = 63″·948 ± 0″·0603.

These diameters, when reduced to the mean distance, give the following results:—

				″		″
Declination (Polar?)	semidiameter	=	8·4308	±	0·0010.
Right Ascension (Equatoreal?)	„	=	8·4633	±	0·0009.
Or Mean semidiameter as a sphere		=	8·4518	±	0·0008.

The following previous determinations may be interesting, for comparison:—

	″		
Encke, from Transits of *Venus*	8·305	Leverrier, *Annales*, vi.	p. 26.
Airy, Measures on Meridian	8·283	Do.	Do.
Main, D. I. Micrometer	8·775	R. A. S. *Memoirs*, xxv.	p 46.
Stone, Measures on Meridian	8·472	R. A. S. *M. N.* xxvi.	p. 59.
Plummer, D. I. Micrometer	8·661	Do. xxxiii.	p. 561.

The value used in the *American Nautical Almanac* is 8″.546.

Roorkee Observatory,
1875, *March* 2.

Note on the Determination of the Scale in Photographs of the Transit of Venus.

By W. H. M. Christie, Esq.

In a paper in the *Monthly Notices* for March Capt. Abney has given reasons for concluding that photographs of the Sun taken by the English method (in which the primary image is enlarged) must be superior in point of definition both to those taken with lenses of very long focus and to daguerreotypes; but there remains the question—Whether there is any difficulty, peculiar to the first method, in determining the scale to which the distance between the centres of *Venus* and the Sun is referred? This question was naturally considered at an early stage of the British preparations; but I am not aware of any definite statement of the method available: and as the issue has been distinctly raised by Mr. Proctor, in a Note printed in the last number of the *Monthly Notices*, it may, perhaps, be worth while to explain a method which is applicable to all photographs by whatever method obtained, whether of the whole Sun or on a Janssen plate,